

94. (added) The member as claimed in claim 92 and wherein the substrate is formed of ceramic and the contact is formed by a deposition process.

95. (added) The member as claimed in claim 94 and wherein the deposition process is selected from the group consisting of stenciling, screen printing, direct writing and doinking.

96. (added) The member as claimed in claim 92 and wherein the raised portions are pointed.

REMARKS

By the Office Action dated April 26, 1996, claims 44, 46-49 and 72-86 have been rejected under 35 USC §103, as being unpatentable over Nakano (Unexamined Japanese Patent Application No. Hei 3-69131). In response to these rejections, claims 78-83 have been amended. In addition, claims 87-96 have been added and claims 44, 46-49, 72-77 and 84-86 have been canceled.

The present invention is directed to a member adapted to make temporary electrical connections with discrete, unpackaged semiconductor dice 21 (Figure 1) for testing. The member includes a substrate 41 (Figure 1) adapted for placement within a burn-in fixture 11. The burn-in fixture 11 is a test apparatus adapted to retain a single die 21 and the substrate 41 and to bias these elements together.

As shown in Figure 6 of the present application, the substrate 41 includes a contact 61 in electrical communication with a conductive trace 45. In addition, the contact 61 includes a plurality of raised portions 73. The raised portions 73 are shaped and dimensioned to penetrate a

recessed metal bond pad 27 on the die 21 to a penetration depth that is less than a thickness of the bond pad 27.

As described in the specification, the substrate 41 can be formed of a semiconductor material and the contact 61 and raised portions 73 formed by semiconductor circuit fabrication techniques (page 14, lines 19-24). Alternately, the substrate 41 can be formed of ceramic and the contact 61 and raised portions 73 can be formed using a deposition process such as doinking, stenciling, screen printing or direct writing (page 17, lines 5-18).

It is submitted that there are numerous differences between the invention defined by the amended claims and the Nakano reference. Firstly, Nakano is directed to a method for forming a probe card for testing semiconductor dice contained on a wafer. This is stated on page 2 of the translation: [Field of Industrial Application]. The Nakano probe is adapted to replace a conventional probe card having probe needles (Figures 6 and 7 of Nakano). The window (14 Figure 1) on the Nakano probe is for aligning the probe card with a die on the wafer. With a probe card an entire wafer containing many dice is stepped under the probe card. Furthermore, the contact force between the probe card and the wafer is externally generated by the probe card fixture.

On the other hand, as stated in the preamble of the amended independent claims, the present invention is a member adapted to make electrical connections for testing discrete, unpackaged dice. Still further, the amended independent claims state that the substrate of the member is "for mounting in a testing apparatus configured to retain a single unpackaged die and to bias the die and substrate together". This type of testing apparatus in which a single die is retained and an internal biasing force is generated between the die and substrate is fundamentally different than a wafer

prober. For this reason it would not be obvious to modify the Nakano probe card in the manner presently claimed.

Secondly, the Nakano probe card is not capable of testing a discrete unpackaged die having bond pads 27 (Figure 6 of present application) formed as a thin layer of metal recessed in a passivation layer 53 (Figure 6 of present application). As shown in Figure 3c of Nakano, the contacts 32 are 10 μ m in height. The pads 25 (Figure 1b) in Nakano appear to be thick film pads rather than thin film, recessed metal pads as presently claimed. The height of these thick film pads appears to be about 20 μ m. This is about twenty times greater than the thickness of a typical thin film aluminum bond pad. A contact sized as in Nakano would completely penetrate a thin film bond pad and damage the integrated circuits formed on the die.

The present independent claims state that the raised portions of the contacts are configured to provide limited penetration into "recessed bond pads" on the die. Furthermore, dependent claims 81 and 88, and independent claim 92, state the height of the raised portions to be about 5000 \AA (antecedent basis page 28, line 11 of specification as originally filed). The presently claimed raised portions differ in size from the Nakano contacts by a factor of about 20 and are thus able to perform a different function. Specifically, the presently sized contacts allow testing of thin film, recessed bond pads on a single unpackaged die held in a test fixture.

Thirdly, Nakano teaches the use of only a single probe contact 22 (Figure 1b) for each contact pad 25 (Figure 1B) on the chip 24 (Figure 1b). On the other hand, the present independent claims define a contact with "a plurality of raised portions". By forming a plurality of raised portions for each bond pad, the testing current is spread out over a larger area. This decreases current density at the points of

contact with the bond pad and helps to prevent localized arcing, welding and a high contact resistance. This is a significant improvement over the Nakano contact.

A final distinction between the present invention and Nakano is that the Nakano contacts 22 are formed by etching a silicon substrate. On the other hand, as shown in Figure 5 and described at page 17, lines 1-18 of the present application, the contacts 61 (Figure 6) can be formed using a deposition process (e.g., doinking, stenciling, screen printing, direct writing). Dependent claims 83, 89 and 94 of the present application recite this distinguishing feature.

The following table outlines the main distinctions between the present claims and the Nakano reference:

<u>Claim</u>	<u>Distinguishing Feature</u>	<u>Nakano</u>
78, 87, 92	"test fixture for a single unpackaged die"	probe card for chips on a wafer
78, 87, 92	"testing single die with thin film recessed bond pads"	testing dice on wafer with thick film pads
78, 87, 92	"contact having a plurality of raised portions"	contact having a single point
78, 87, 92	"mounting in test apparatus configured to retain and bias"	probe card used with wafer stepper to generate external forces
81, 88, 92	"5000Å raised portions"	10µm probe contacts that are 20X present size
83, 89, 94	"deposition process for forming contacts"	etching silicon to form contacts

In view of the above amendments and arguments, it is submitted that the rejections have been overcome and that claims 78-83 and 87-96 are now in a condition for allowance. Should any other issues remain, it is requested that the Examiner contact the undersigned by telephone.

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